Data center growth in Europe expands to emerging markets

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Data centers are becoming a structural component of Europe's electricity demand. This report examines how key drivers such as electricity prices, digital infrastructure, and regulatory conditions influence local data center growth and why certain markets attract specific types of facilities.

Summary

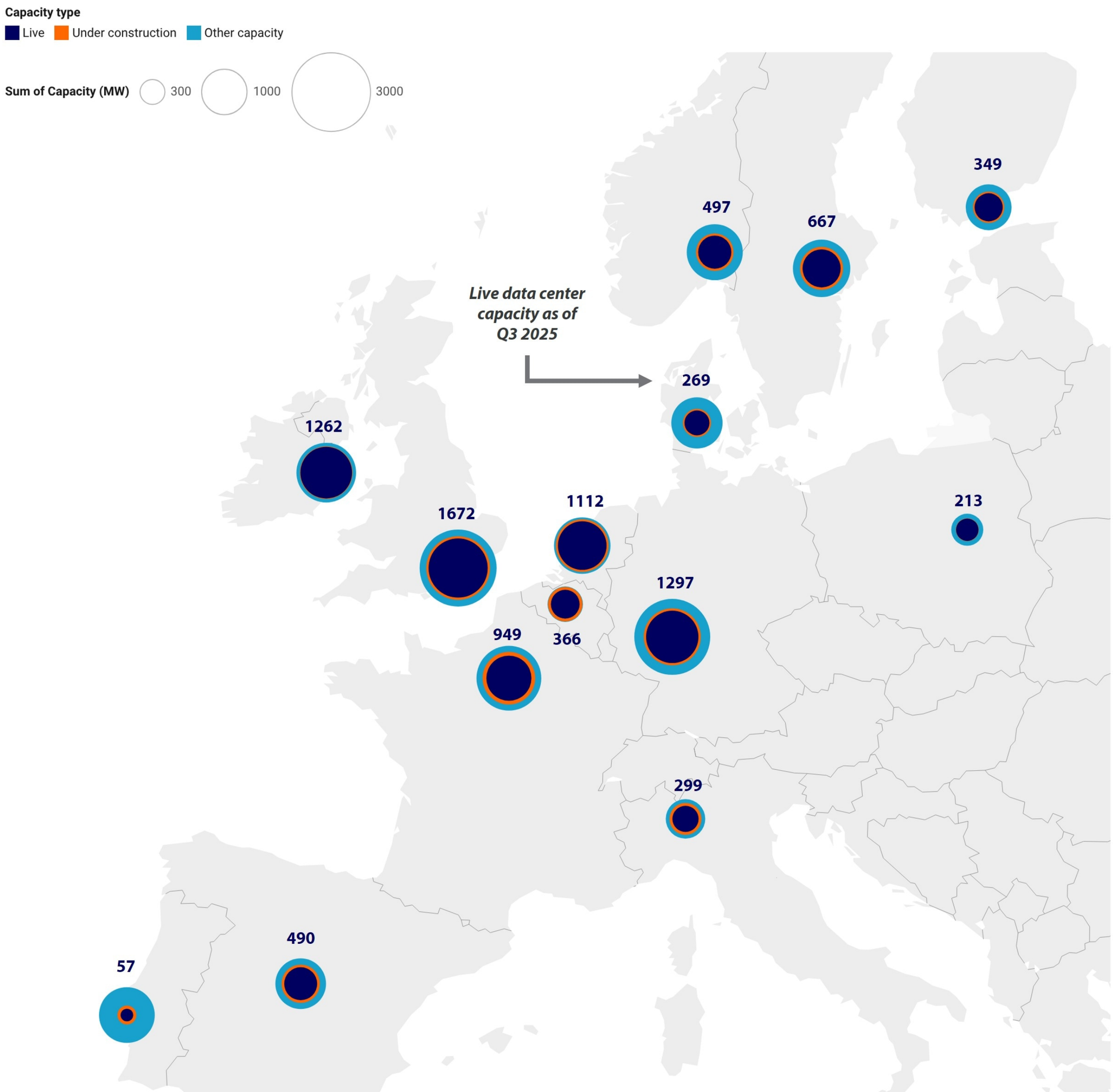
- Data centers are becoming an increasingly relevant source of electricity demand in Europe, driven by continued cloud adoption and rapid scaling of artificial intelligence workloads.
- Access to lowcarbon electricity at scale is emerging as a key differentiator. Availability of renewable energy generation and the growing maturity of corporate power purchase agreement markets determine where large facilities can secure reliable and decarbonized power supply.
- Grid congestion, land limitations, and planning restrictions increasingly constrain the expansion of established core data center hubs. As a result, new developments are gradually emerging in alternative markets in Europe.
- This geographic shift carries implications for electricity networks, infrastructure planning, and investment, as data centers are transitioning from marginal loads to system-relevant components of Europe's power system.
- Grid access, power-system deliverability, and regulatory conditions often outweigh differences in wholesale electricity prices for projects under consideration and increasingly shape location decisions for new data center capacity.

Europe faces growing power demand from data centers

Data centers are playing a growing role in Europe's electricity demand and currently account for an estimated 2% to 3% of total European electricity consumption, or roughly 60 to 100TWh per year. [1] Driven by cloud adoption, artificial intelligence (AI), highperformance computing, and broader digitalization, demand is set to rise substantially over the coming decade. By 2030, electricity consumption from data centers may reach around 150 to 170TWh, close to 5% of total projected European electricity demand, making them one of the fastestgrowing demand segments in Europe's electrification landscape. [2]

Data center development remains uneven across Europe (see figure 1). While initial growth was concentrated in Frankfurt, London, Amsterdam, Paris, and Dublin (FLAP-D) due to their high digital connectivity, these markets are becoming saturated. Increasingly, new capacity is built in Nordic markets,[3] Spain, Belgium, Italy, Poland, and Portugal. In this report, we analyze the key drivers that determine the location of new data centers, how they interact to influence location decisions, and how they are reshaping the geography of data center growth within Europe's electricity system.

Figure 1: Data center capacity per country and capacity type, 2026



Note: "Other capacity" is any announced capacity that is not yet live or under construction. All capacities are IT capacity, meaning power usage effectiveness (PUE) is not included. Source: BloombergNEF, RaboResearch 2026

Drivers shaping regional data center growth

While multiple drivers influence data center development across Europe (see table 1), power system conditions play an increasingly relevant role. Developers search for locations with adequate digital infrastructure and regulatory conditions, as well as access to affordable and, preferably, clean power. In its 2026 outlook, the European Data Center Association (EUDCA) reports that access to power is consistently cited among the main challenges. Understanding how the different drivers vary across Europe helps to identify the most attractive markets for new data center capacity and thus where additional electricity can grow fastest.

Table 1: Core drivers shaping data center development in Europe

Driver	*What it captures*	*Why it matters*
Access to the grid	Availability of grid connection capacity at the required location, including connection queues, reinforcement needs, and delivery timelines.	Data centers depend on timely grid access; limited connection capacity or long lead times can delay or redirect development.
Access to affordable and renewable power	Availability of stable electricity supply, low-carbon generation, and long-term contracting options such as power purchase agreements (PPAs).	Reliable, low-carbon, and cost-predictable power is increasingly critical, particularly for power-intensive workloads.
Access to predictable permitting and connection processes	Clarity, consistency, and executability of regulatory and permitting processes, as well as institutional experience with large electricity users.	Regulatory predictability influences delivery risk and project timelines.
Access to digital infrastructure and connectivity	Access to high-capacity fiber networks, internet exchange points, the end user, and integration into wider digital ecosystems.	Connectivity underpins service quality and enables data centers to operate within distributed, cross-border architectures.

Source: RaboResearch 2026

The importance of each driver depends on the type of data center and in particular on the workload characteristics of an individual project. Three main types of workloads are cloud computing, AI inference, and AI training, and these workloads have different priorities. Cloud computing and AI inference prioritize proximity and connectivity, while AI training prioritizes scalable, reliable power and cost certainty. Therefore, different European countries are likely to attract different mixes and types of data center workloads.

Figure 2: Types of data centers

Source: RaboResearch 2025

Data center workloads

Data center capacity is typically expressed in megawatts (MW), a scale that reflects the central role of power availability as a binding constraint. Knowing the differences in workload characteristics is critical for understanding both electricity demand profiles and location choices. Three workload types are particularly relevant.

Cloud computing workloads

Cloud computing workloads: General-purpose computing with stable utilization and moderate power densities. They require continuous 24/7 power to meet service-level agreements and show predictable, base-load demand with limited flexibility. These workloads cluster in established digital hubs with strong connectivity, deep ecosystems, and proximity to major user markets.

AI inference workloads

AI inference workloads: Run trained models for real-time services such as search, recommendations, and language queries. They are highly latency-sensitive and therefore located close to end users. Inference workloads operate at higher power densities and scale with user activity, concentrating in major metropolitan regions with dense fiber networks. Despite fluctuations, they still require uninterrupted power, as service interruptions directly impact real-time applications.

AI training workloads

AI training workloads: Develop large-scale machine-learning and foundation models. They are extremely power-intensive, run at very high utilization for days or weeks, and are not latency-sensitive. Training workloads increasingly gravitate toward locations with abundant, reliable electricity and sufficient grid headroom for high-density build-outs.

These workload differences explain why grid access, clean and reliable power, and digital connectivity weigh differently across markets. While all workloads depend on uninterrupted electricity, their distinct utilization patterns and flexibility levels shape aggregate demand and siting decisions. Different data center formats host different mixes of these workloads, shaping varied electricity profiles and location choices across Europe.

Access to the grid

Data centers require a substantial grid connection, ranging from 1MW to 100+MW, depending on the type of data center and workload. As grid connections become increasingly scarce across Europe,[4] grid access is becoming a leading driver for data center growth. Limited grid connection availability in a market poses risks of delays or cancelations.

Indicators for assessing grid connection availability include local grid connection queues, connection allocation policies, and planned grid and network reinforcement projects. Transmission system operators across Europe have reported expanding backlogs for large new connections, as electrification makes end users compete for limited network capacity. Moreover, some countries are moving away from the first-come-first-serve principle for grid connections and prioritizing projects that serve public interests, which might result in a disadvantage for data centers. Some have even implemented moratoriums (Ireland[5] and the Netherlands) on new data center capacity.

Although a large data center can typically be constructed within roughly two years, actual delivery timelines now average close to four, largely influenced by the availability and timing of grid connection capacity. According to Ember, connecting a new data center in traditionally congested markets (FLAP-D) can take up to 10 years or more when significant upgrades are needed, while in other countries with more proactive planning (Belgium, Portugal, Spain, Nordic countries, and Italy) the process can be significantly shorter.[6] Where reinforcement of substations or transmission infrastructure is required, connection lead times can extend significantly.

Connection queues are emerging where local grid capacity has not kept pace with rising demand, reflecting broader electrification trends alongside rapid digital expansion. These extended timelines increasingly shape developers' location decisions. New projects can be realized more rapidly in areas where grids can deliver connection capacity within a predictable timeframe. In areas where queues are long and reinforcement uncertain, capacity may be delayed, downsized, or reconsidered. Analysis by EUDCA underscores that time-to-connection has become a central driver, in some cases outweighing traditional factors such as land cost or regulatory incentives.

Countries that undertake anticipatory grid planning, advance reinforcement projects, and clarify connection pathways improve their competitive position for attracting data center and AI-related investments.

Access to clean, cost-predictable, and contractable power

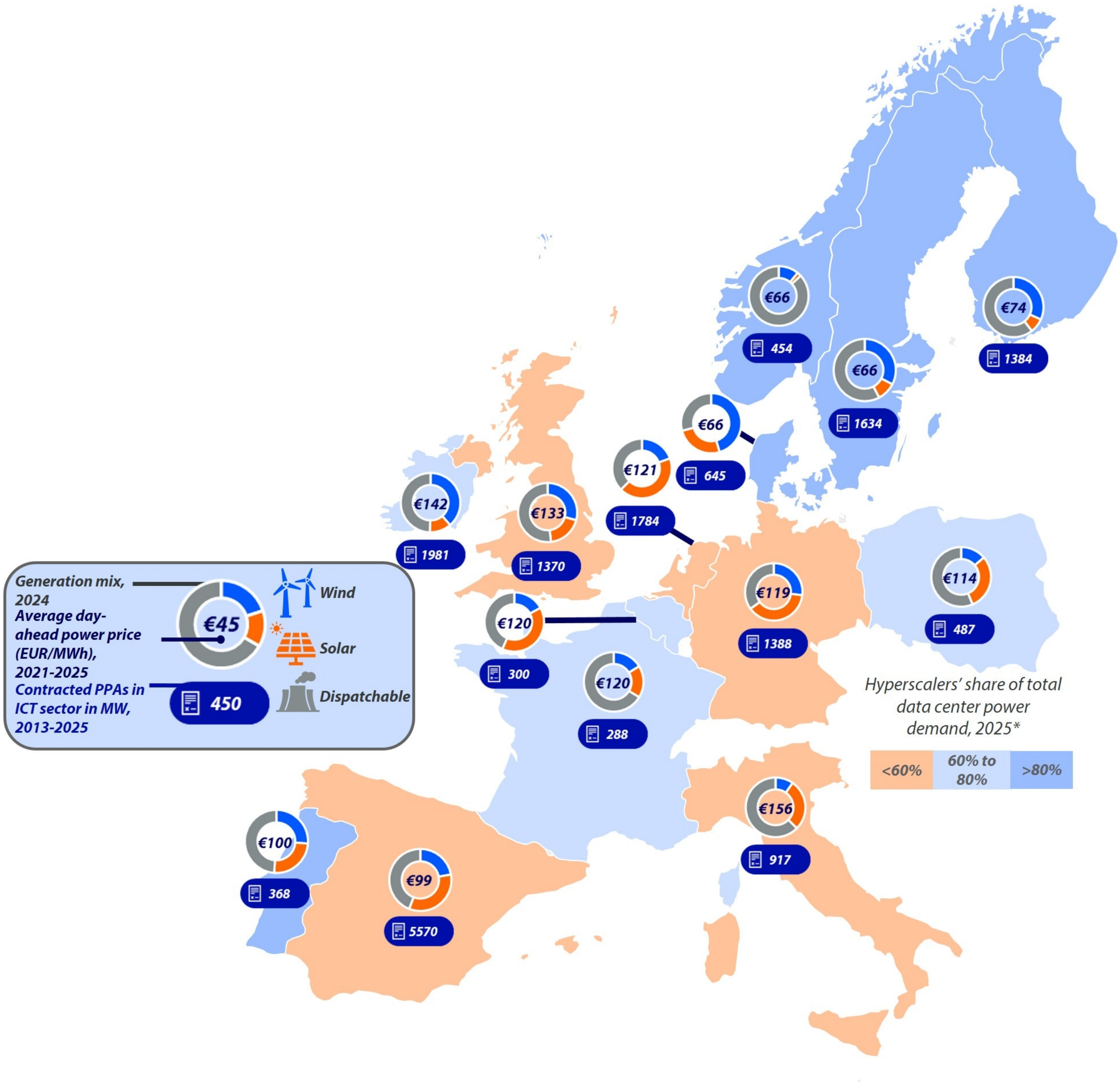
Electricity is a major operating expense for data centers. Predictable and low power prices are therefore crucial, particularly for power-intensive workloads such as AI training. As electricity prices are subject to both short-term volatility and long-term uncertainty, data centers typically hedge price risks by signing a power purchase agreement (PPA) for multiyear periods.

Data centers are one of the largest offtakers of PPAs in Europe. Contracts are typically signed with solar or wind project developers, who need the PPA to hedge their own risks. Through such agreements, renewable energy projects facilitate the construction of data centers by ensuring their power supply, and data centers enable the materialization of new renewable generation capacity by ensuring revenues. Data centers in Europe have committed to becoming climateneutral by 2030, including operating on 100% carbonfree energy and meeting strict efficiency targets under the Climate Neutral Data Center Pact. Beyond sectorwide commitments, individual hyperscale firms have announced their own netzero pathways, often aiming for complete decarbonization well before 2050.

Multiple factors influence PPA prices and volumes, including solar and wind generation capacity and local wholesale electricity prices. Figure 2 shows that PPAs signed with offtakers in the information, communication, and technology (ICT) sector are most common in countries with high shares of solar and wind energy in the generation mix, such as Spain, Nordic countries, Germany, the Netherlands, the UK, and Ireland. The figure also reveals a correlation between average wholesale power prices and the share of hyperscale data centers. Because the power demand of data centers is so high, electricity prices play a decisive role in where they are located.

However, PPAs do not have to be limited to one country. Through nonphysical PPAs, data centers can, on paper, procure energy from a country with excess cheap renewables and consume it in a country with higher electricity prices. Typically, the negotiated price on such a PPA sits between the wholesale electricity prices of the two markets.

Figure 3: Power prices, PPA volumes, and hyperscalers across Europe



Note: Around 80% of total contracted PPAs in the ICT sector between 2013 and 2025 occurred between 2021 and 2025. "Hyperscaler" refers to hyperscale data centers with >40 MW power capacity. Source: Bloomberg, BloombergNEF, RE-Source, RaboResearch 2026

Access to digital infrastructure and connectivity

Digital connectivity refers to access to high-capacity fiber networks, major internet exchange points (IXPs), international subsea cable routes, and integration into dense digital ecosystems. It enables data centers to operate within distributed, cross-border architectures by reducing latency, increasing redundancy, and facilitating efficient interconnection for cloud services, AI inference, and content delivery.

Europe's established digital hubs are anchored by some of the world's largest IXPs, including DE-CIX, AMS-IX, and LINX, which support internet traffic volumes and provide low-latency connectivity across western Europe. Dense metropolitan fiber networks in these regions reinforce their role as interconnection centers for hyperscale and colocation facilities.

Table 2: Digital connectivity in Europe

Regions/countries	*Explanation*
Core hubs *Germany, the UK, the Netherlands, France, and Ireland*	Dense metro fiber networks and large IXPs in Frankfurt, Amsterdam, London, and Paris support low-latency interconnection and mature digital ecosystems.
Nordic markets *Denmark, Finland, Norway, and Sweden*	Strong long-haul fiber backhauls and reliable infrastructure, though geographically more peripheral in pan-European routing. Connectivity supports distributed architecture and latency-tolerant workloads.
Southern Europe *Italy, Portugal, and Spain*	Increasing importance of Mediterranean and transatlantic cable systems into Lisbon, Barcelona, and Genoa. International connectivity is expanding, narrowing historical gaps with core hubs.
Diversification markets *Belgium and Poland*	Growing cross-border fiber capacity and developing regional interconnection nodes. Traffic flows remain partly dependent on western European hubs, but infrastructure is improving.

Source: BloombergNEF, Cushman & Wakefield, RaboResearch 2026

Access to predictable permitting and connection frameworks

Regulatory frameworks shape how quickly and predictably data center projects can move from planning to operation. In the current context, this primarily concerns how grid connection applications are assessed and prioritized, how reinforcement costs are allocated, and how permitting processes are coordinated across national and regional authorities in Europe. These elements directly influence time-to-power and overall project risk.

In congested hubs, queue access and connection sequencing are central. In large continental systems, coordination across administrative layers shapes execution. In diversification markets, regulatory frameworks are adapting to rising volumes of large-load applications. Differences in cost-allocation approaches and in the balance between transmission- and distribution-level constraints further influence project economics and connection timelines.

Besides regulatory environments, market track records are also an indicator of how likely regulatory hurdles are in particular regions. Markets with experience in hosting large infrastructure projects often benefit from accumulated expertise among grid operators, utilities, contractors, and permitting authorities. In markets with less historical concentration of hyperscale facilities, institutional capacity may still be adapting to the scale and complexity of large data center loads.

Table 3: European data center market clusters: focus, friction, and track record

Regions/countries	*Regulatory focus*	*Key points of friction*	*Market track record*
Core constrained hubs *Ireland, the Netherlands*	Sequencing large-load connections under active congestion.	Connection limits, queue management, political and societal scrutiny, evolving discussions on allocation of reinforcement costs.	Highly experienced hyperscale markets; strong institutional capacity operating under tightening infrastructure limits.
Large continental systems *France, Germany, and the UK*	Integrating substantial new loads within established energy and planning frameworks	Regional grid congestion, layered permitting structures, variation between national and regional implementation; differences in cost allocation by jurisdiction.	Strong institutional capacity; significant regional variation in execution feasibility.
Iberian markets *Portugal and Spain*	Expanding grid infrastructure alongside renewable deployment and digital investment,	Transmission bottlenecks in selected areas, evolving permitting processes, coordination between energy and spatial planning authorities.	Growing experience with large-scale projects, regulatory frameworks adapting alongside infrastructure expansion.
Nordic markets *Denmark, Finland, Norway, and Sweden*	Balancing industrial growth with grid stability and sustainability objectives.	Localized reinforcement requirements, project-specific technical conditions, regional transmission constraints.	Stable and coordinated energy institutions, proactive grid planning, increasing strategic focus on digital infrastructure.
Diversification markets *Belgium, Italy, and Poland*	Managing rising large-load applications while maintaining system reliability.	Emerging queue pressure in selected regions, multilevel coordination challenges between transmission system operators and regional authorities.	Stable institutional environments, regulatory frameworks adapting to increasing data center interest and demand growth.

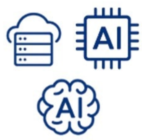
Note: Regulatory conditions reflect publicly available information as of early 2026. Implementation and sequencing remain subject to regional variation and evolving infrastructure planning. Regulatory and grid conditions may vary materially within countries, depending on regional infrastructure constraints and permitting practices. Source: Cushman & Wakefield, Ember, European Commission, EUDCA, JLL, RaboResearch 2026

Bringing the drivers together: A cluster-based perspective

Taken together, these drivers show clear patterns in how data center development concentrates and shifts across Europe. These clusters reflect how power system conditions, grid readiness, spatial limits, regulation, and workload needs interact.

Differences in workload characteristics play an important role in shaping these patterns. Latencysensitive workloads such as cloud computing and AI inference tend to favor locations with strong connectivity and proximity to end users, while powerintensive AI training workloads are more sensitive to power availability, grid access, and access to clean and reliable electricity.

Table 4: Key drivers of data center location

Cluster (countries)	*Access to the grid*	*Access to clean, cost-predictable, and contractable power*	*Access to predictable permitting and connection frameworks*	*Access to digital infrastructure and connectivity*	*Most suitable workloads*
Core hubs *(FLAP-D)*	Long queues in key zones, reinforcement-linked delays.	Strong access to low-carbon supply in some markets, variable cost exposure.	Mature and experienced environment but increasingly tightening in high-demand areas.	Greatest ecosystem depth; dense fiber and IXPs; proximity to major demand.	
Expanded core *Regional France, the UK, and Germany*	More grid headroom in certain regions, timelines improving outside primary nodes.	Stable supply mix, access to PPAs generally good.	Generally predictable permitting, strong administrative capacity.	Strong national connectivity, slightly less dense than core hubs.	
Nordic markets *Denmark, Finland, Norway, and Sweden*	Relatively stronger grid headroom in many regions, proactive planning in parts.	Abundant low-carbon power, competitive long-term contracting.	Stable, investment-friendly environment, planning integrated with grid development.	Strong domestic connectivity, further from large end-user markets.	
Iberian markets *Portugal and Spain*	Growing grid capacity, occasional congestion, reinforcement ongoing.	Rapid expansion of renewable energy, improving PPA markets.	Improving regulatory clarity, permitting speed varies.	Improving connectivity, fewer legacy digital hubs.	
Diversification markets *Belgium, Italy, and Poland*	Comparatively good grid headroom availability, rising application pressure.	Integrated European power markets, good contracting environment.	Stable institutions, grid operators increasingly coordinating location choices.	Strong cross-border connectivity.	

Note: All data center workloads are applicable in most regions. Cloud hyperscale data centers are also likely to be placed in Nordic countries. Yet, based on the predefined characteristics, we assess them to be most suitable in certain regions. Source: RaboResearch 2026

Core hubs under constraint: The Netherlands and Ireland

The Netherlands and Ireland remain central to Europe's data center landscape and form part of the traditional FLAP-D core. These markets benefit from strong digital connectivity, proximity to major demand centers, and mature data center ecosystems. Dense fiber networks, major IXPs, and established supply chains support a wide range of workloads, particularly cloud computing and AI inference.

However, structural constraints increasingly bind both countries. Grid congestion and extended connection timelines have become decisive barriers to new large-scale developments. In Ireland, connection limits and grid stability concerns have directly affected the pace of new approvals, while in the Netherlands, regional congestion and land scarcity have slowed expansion. As a result, growth is shifting from unconstrained greenfield development toward optimization, densification, and delivery of select projects. While demand remains strong, infrastructure constraints increasingly determine the type, scale, and timing of new capacity.

Large continental systems: Germany, France, and the UK

Germany, France, and the United Kingdom combine large domestic demand with electricity systems capable of absorbing substantial additional load at the national level. Their scale reduces the likelihood that data centers will become an immediate system-wide concern, although local grid conditions remain critical. Proximity to major industrial and enterprise users continues to support sustained demand.

France benefits from access to stable and relatively low-carbon electricity, supporting workloads with high and continuous power demand, including certain AI-related applications. Germany faces more complex grid congestion patterns and regional permitting dynamics, which shape where capacity can realistically be delivered. The United Kingdom combines strong digital connectivity with regional variation in grid headroom, leading to increasing development outside traditional London-centric clusters. In all three markets, feasibility depends heavily on regional infrastructure.

Emerging alternatives with scalable power: Spain and Portugal

Spain and Portugal are increasingly positioned as alternative growth markets for data center development. These countries benefit from comparatively greater land availability, expanding power system capacity, and rapid renewable energy deployment. The growing maturity of corporate PPA markets improves access to low-carbon electricity at scale, while new subsea cable landings strengthen global connectivity.

This makes Iberian markets attractive for AI training and other power-intensive workloads. However, local transmission constraints and permitting timelines still affect deliverability. As reinforcement and grid expansion progress, Spain and Portugal are well positioned to capture a larger share of incremental capacity.

Clean power and system efficiency: Denmark, Finland, Norway, and Sweden

Denmark, Finland, Norway, and Sweden stand out for their access to low-carbon electricity and, in several cases, abundant dispatchable power. Combined with cooler climates and highly efficient systems, these characteristics support lower operating costs and alignment with corporate sustainability objectives.

These advantages are particularly relevant for large-scale and energy-intensive workloads, including AI training. However, distance from major demand centers and thinner ecosystems limit Nordic countries' ability to replace established digital hubs. As a result, the Nordic markets are more likely to attract specific workload types rather than a full spectrum of data center activity.

Diversification markets: Italy, Belgium, and Poland

Italy, Belgium, and Poland are increasingly positioned as diversification markets within Europe's evolving data center geography. While not traditional hyperscale hubs, they are attracting spillover demand from more constrained regions, supported by selected areas of grid availability, expanding deployment of renewable energy, and strong integration with European electricity and digital networks.

Belgium benefits from its central location and cross-border interconnection, making it a logical recipient of demand shifting from neighboring congested markets. Italy combines growing domestic digital demand with regional variation in grid headroom, particularly in its northern regions. Poland adds scale and a rapidly expanding digital economy, supported by ongoing infrastructure investment and integration into the European power system. These markets complement established hubs by absorbing demand where grid access and permitting remain manageable.

Beyond the core: How structural constraints are reshaping data center growth in Europe

Structural constraints in electricity systems and supporting infrastructure will increasingly shape data center growth in Europe. As facilities scale in size and power intensity, access to grid connection capacity, system headroom, and predictable reinforcement timelines will largely determine where new capacity can be delivered.

The rise of AI is accelerating these dynamics, as higher utilization rates and power density reduce operational flexibility and increase the system impact of each new megawatt. This will place greater emphasis on locations where reliable electricity can be secured at scale, whether through inherent system characteristics or mature contracting frameworks offering longterm cost visibility. Data centers are also becoming major buyers of renewable PPAs in Europe, driven by sustainability goals and tightening power supply.

At the same time, growth will not shift uniformly away from established hubs. Latencysensitive workloads such as cloud computing and AI inference will remain anchored in core digital markets, while more powerintensive, latencyflexible workloads like AI training may move toward regions with fewer grid constraints. The interaction of these structural constraints with workload characteristics is increasingly determining which markets can support powerintensive growth and which remain limited to latencydriven activity.

Taken together, these dynamics point to a more regionally differentiated pattern of data center growth, shaped by grid reinforcement timelines, permitting outcomes, and national policy. Rather than a single new hub emerging, Europe is likely to develop a more distributed network of markets increasingly embedded within national electricity systems.

Footnotes

[1] Source: BloombergNEF Global IT Capacity datacenters 2025

[2] Source: JLL 2026 Global Data Center Outlook

[3] Nordic countries include Denmark, Finland, Norway, and Sweden.

[4] Source: JLL 2026 Global Data Center Outlook

[5] Although no longer a moratorium as of December 2025, Ireland’s policy has not lowered the bar for new data centers. Instead, strict, measurable conditions have replaced the former de facto freeze, including requirements for onsite or proximate generation equal to 100% of demand and an 80% renewablematching obligation.

[6] Source: JLL 2026 Global Data Center Outlook

Source

https://knowledge.rabobank.com/en/knowledge/d011517320-data-center-growth-in-europe-expands-to-emerging-markets